

Article
34

Claims

1. Cooling ceiling (10) comprising cooling tube mats (34), which are attached or attachable by means of a carrying system (12, 14) to a bare ceiling or to an existing ceiling, wherein the cooling tubes are arranged inside a sandwich construction with upper and lower fire resistant dry building panels (16, 26), such as sandwich-type plaster board panels or gypsum fibre board panels and also spacers located between the dry building panels, wherein the upper panels (16) are optionally provided with a thermal barrier (20), for example a foil of aluminium, characterized in that the cooling tubes are provided in the form of cooling tube mats, which can be connected together and arranged in shallow hollow cavities (24), which are formed by the spacers (22) between the upper and lower dry building panels (16, 26).
2. Cooling ceiling (10) in accordance with claim 2, characterized in that a sound insulating fleece (32) is arranged beneath the cooling tube mat (34) on the upper side of the lower dry building panels (26).
3. a Cooling ceiling (10) in accordance with one of the preceding claims, characterized in that it is assembled from premanufactured elements (16, 22, 26).
4. Cooling ceiling (10) in accordance with claim 3, characterized in that the elements which receive the cooling tube mats in hollow cavities (24) each comprise an upper dry building panel (16), a lower dry building panel (26) and at least two preferably bar-like spacers (22).
5. Cooling ceiling (10) in accordance with claim 4, characterized in that, with a ceiling which is put together from the named elements, not every hollow cavity is provided with a cooling tube mat (34).
6. a Cooling ceiling (10) in accordance with one of the preceding claims, characterized in that the attachment of the upper and lower panels (16, 26) to one another takes place at positions at which spaces (22) are provided.
7. Cooling ceiling (10) in accordance with claim 6, characterized in that the upper panels (16) are either directly mounted on the upper ceiling or to a lath arrangement or to hangers (12) or preferably to so-called CD-sections (14) carried by corresponding hangers, which have a maximum spacing (center-to-center spacing) of 625 mm.
8. Cooling ceiling (10) in accordance with claim 7, characterized in that the upper panel (16) are sandwich-type plaster boards which have a length of 2000 mm, a width of 1250 mm and a thickness of 12.5 mm.
9. Cooling ceiling (10) in accordance with one of the claims 7 to 8, characterized in that the spacers (22) are plaster bars with a width of approximately 12.5 cm and a thickness of approximately 6 mm, with the plaster bars being arranged with a clear spacing of 50 cm maximum.
10. Cooling ceiling (10) in accordance with one of the claims 7 to 9, characterized in that the lower panels (26) are sandwich-type plaster boards which preferably have a length of 2000 mm, a width of 1250 mm and a thickness of 12.5 mm.
11. Cooling ceiling (10) in accordance with claim 2 and one of the claims 7 to 10, characterized in that the sound insulating fleece (32) has a thickness of 2 mm.

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- b) of spacers (22) which are attachable to the lower side of the upper dry building panels (16), which are optionally already attached to the upper panels during their manufacture,
 - c) of lower dry building panels (26) which are attachable to the spacers (22) in order to form the hollow cavities (24) which receive the cooling tube mats (34), and
 - d) optionally a sound insulation (32), preferably in the form of a sound insulating fleece which is either attachable between the spacers (22) and the upper side of the lower panels (26) or is attachable in the manner of a wallpaper to the lower side of the lower panels (26).
12. Cooling ceiling (10) in accordance with claim 5, characterized in that the upper panels (16) are either directly attachable to the upper ceiling or to a lath arrangement or to hangers (12) or preferably to so-called CD-sections (14) carried by corresponding hangers, which have a maximum spacing (center-to-center spacing) of 625 mm.
13. Cooling ceiling (10) in accordance with claim 11 or 12, characterized in that the upper panel (16) are sandwich-type plaster boards which preferably have a length of 2000 mm, a width of 1250 mm and a thickness of 12.5 mm.
14. Cooling ceiling (10) in accordance with one of the claims 11 to 13, characterized in that the spacers (22) are plaster bars with a width of approximately 12.5 cm and a thickness of approximately 6 mm, with the plaster bars being arranged with a clear spacing of 50 cm maximum.
15. Cooling ceiling (10) in accordance with one of the claims 11 to 14, characterized in that the lower panels (26) are sandwich-type plaster boards which preferably have a length of 2000 mm, a width of 1250 mm and a thickness of 12.5 mm.
16. Cooling ceiling (10) in accordance with one of the claims 11 to 15, characterized in that the sound insulating fleece (32) has a thickness of 2 mm.
17. Cooling ceiling (10) consisting of cooling tube mats (34), in particular plastic cooling tube mats, which are arranged or attachable to a bare ceiling or to an existing lower ceiling by means of a carrier system (12, 14), characterized in that the carrier system (12, 14) comprises a plurality of dry building panels (12), in particular fire resistant dry building panels such as sandwich-type plaster board panels or gypsum fibre board panels, which are assembled together into an areal arrangement, in that the individual cooling tube mats (34) arranged in groups or in a matrix form are accommodated beneath the surface formed by the dry building panels, or in cut-outs within the dry building panels, and are optionally carried by the latter, with the cooling tube sections of the cooling tube mats which extend parallel to one another being embedded, at least in their upper regions, in a material which fills out the hollow cavities between the tubes, or being at least partly accommodated in grooves in the lower side of the dry building panels, with the grooves having a cross-sectional shape complementary to the cross-sectional shape of the upper side of the tubes, and wherein the connections to the cooling tube mats are led upwardly and are connectable to one another above the dry building panels and are connectable to outflow and supply tubes for the coolant.
18. Cooling ceiling (10) in accordance with claim 17, characterized in that the embedding material for the cooling tubes of the cooling tube mats is a plastic foam material, in particular a plastic foam material with closed pores of a preferably recyclable type which is non-combustible and preferably does not produce any poisonous vapors when heated.
19. Cooling ceiling (10) in accordance with claim 17, characterized in that the embedding material is gypsum or gypsum fibre material.
20. Cooling ceiling (10) in accordance with one of the claims 17 to 19, characterized in that the tubes of the cooling mats have a downwardly flattened, for example D-shaped cross-section.
21. Cooling ceiling (10) in accordance with one of the claims 17 to 19, characterized in that the tubes of the

cooling tube mats have a circular cross-section which are only embedded to the equator in grooves in the lower side of the upper dry building panels or in the embedding material.

22. Cooling ceiling (10) in accordance with one of the claims 17 to 21, characterized in that a thermally reflecting layer, for example an aluminium foil, optionally laminated with reinforcing threads or grids, is provided above the cooling tube mats, either at the upper surface of the embedding material or beneath the dry building panels.
23. Cooling ceiling (10) in accordance with one of the claims 17 to 22, characterized in that further dry building panels (26) are arranged beneath the dry building panels (16), beneath the cooling tube mats, with spacer elements, for example strips of dry building panel material, being arranged between the upper dry building panels (16) and the lower dry building panels (26) in order to form hollow cavities with a height which corresponds to the thickness of the cooling tube mats with the embedding material, with the spacer elements having a spacing from one another which corresponds to the width or the length of the cooling tube mats with the embedding material and wherein the hollow cavities which receive the cooling tube mats are fully filled out by the cooling tube mats.
24. Cooling ceiling (10) in accordance with claim 17 in which the tubes of the cooling tube mats are accommodated in grooves in the lower side of the dry building panels, characterized in that further dry building panels are arranged beneath the cooling tube mats which likewise have grooves and are so arranged that the cylindrical spaces formed between oppositely disposed grooves of the upper and lower dry building panels are filled out by the tubes of the cooling tube mats and in that the regions between the cooling tube mats beneath the upper dry building panels are optionally filled out with further dry building panels in order to form a continuous flat lower side of the ceiling
25. Cooling ceiling (10) in accordance with one of the claims 17 to 24, characterized in that its lower side, i.e. the lower side of the dry building panels and of the cooling tube mats arranged in cut-outs of the upper dry building panels is directly painted.
26. Cooling ceiling (10) in accordance with one of the claims 17 to 24, characterized in that its lower side, i.e. the lower side of the dry building panels and of the cooling tube mats arranged in cut-outs of the upper dry building panels is provided with a coating, for example a glass fabric and/or spray plaster.
27. Cooling ceiling (10) in accordance with one of the preceding claims, characterized in that the lower dry building panels are provided with holes or apertures.
28. Prefinished element (16, 22, 26) for use in a cooling ceiling (10) in accordance with one of the preceding claims.
29. Cooling tube mat (34), in particular for use with a cooling ceiling in accordance with one of the preceding claims, characterized in that it is provided at one side with a thermal barrier (20), for example with an aluminium foil or a vapor deposited aluminium layer.
30. Cooling tube mat (34) in accordance with claim 28, characterized in that it is provided at the other side with a sound insulation (32).
31. Cooling tube mat (34) in particular for use with a cooling ceiling (10) in accordance with one of the preceding claims, characterized in that it consists of tubes which are embedded in an embedding material.
32. Cooling tube mat (34) in accordance with claim 31, characterized in that the embedding material is a plastic foam material, in particular a plastic foam material with closed pores of the preferably recyclable type and is preferably non-combustible and preferably generates no poisonous vapors on heating.
33. Cooling tube mat (34) in accordance with claim 31, characterized in that the embedding material is gypsum

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or gypsum fibre material.

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